



# INNOVATIVE INTERSECTIONS

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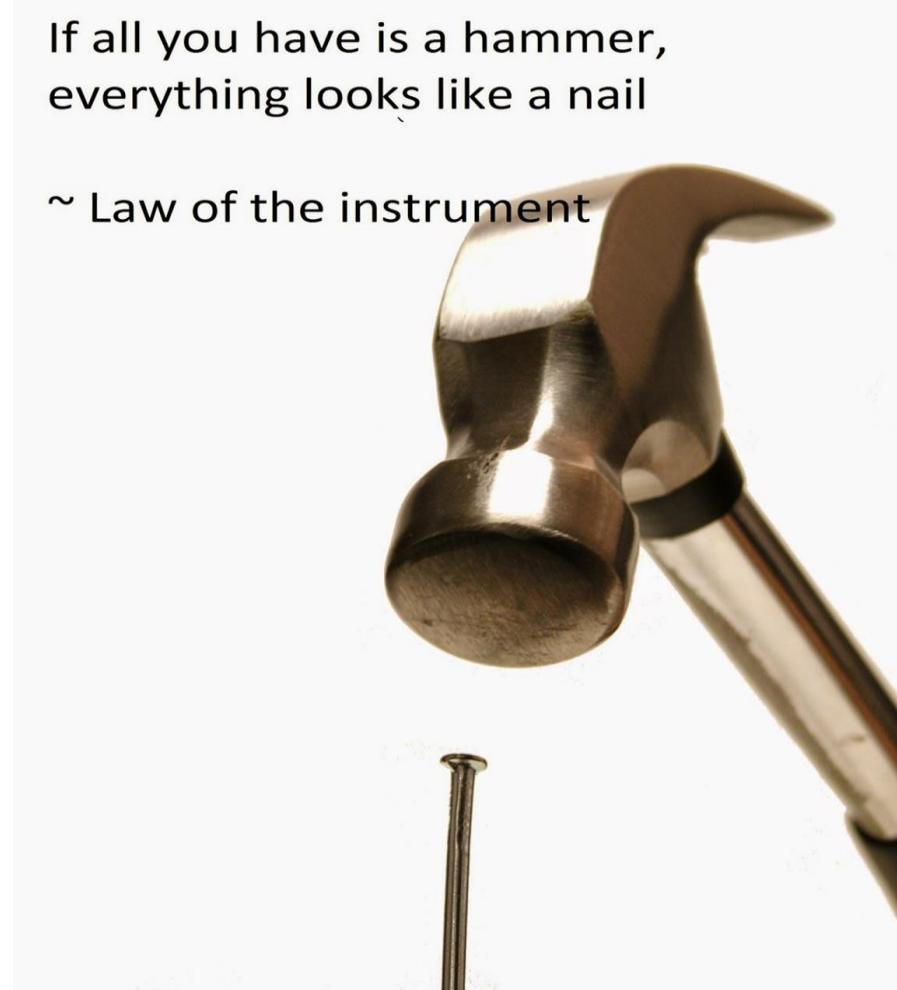
# Current Tools

## Common Project Solutions

- Traffic Signalization
- Widening Projects
- New Roadways

If all you have is a hammer,  
everything looks like a nail

~ Law of the instrument



# Expanded Tools

## Expanded Solutions

- **Restricted Movements**
  - **Improve Safety**
- **Innovative Intersections**
  - **Improve Capacity**
- **New Technologies**
  - **Adaptive Controllers**
- **Removal of Signals**



# Why Innovative Intersections?

## Current Situation:

- We need to improve safety
  - About half of all severe injuries occur at intersections
  - Left-Turn and angle crashes account for 60% of fatal crashes at intersections
- Congestion is increasing
- Funding is constrained
- Right-of-Way is expensive
- Projects take a long time to construct and have many impacts

**Innovative Intersections are a tool that can help address each of these**



# What are Innovative Intersections

Innovative designs that:

- Improve the way traffic makes certain movements by eliminating, relocating or modifying conflict points
- Strategically improve signalization
  - Remove signalization
  - Reduce signal phases if signalization is required (Two-Phased Operation)





# Signal Phase Impacts

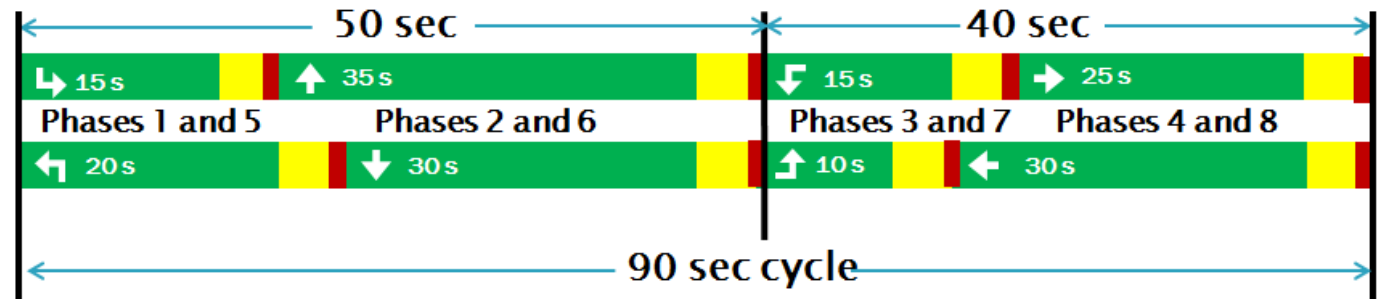
- **Reduces Intersection and Roadway Capacity**
  - Signals reduce roadway capacity
  - Capacity reduction is a function of green time
- **Increases delay**
- **Reduced mobility**
  - Makes it difficult to coordinate traffic signals for progression
- **Inefficient Use of Green Time (Lost Time)**
  - Start up loss
  - Yellow Time
  - All-Red Time



# Signal Phase Impacts

Conventional

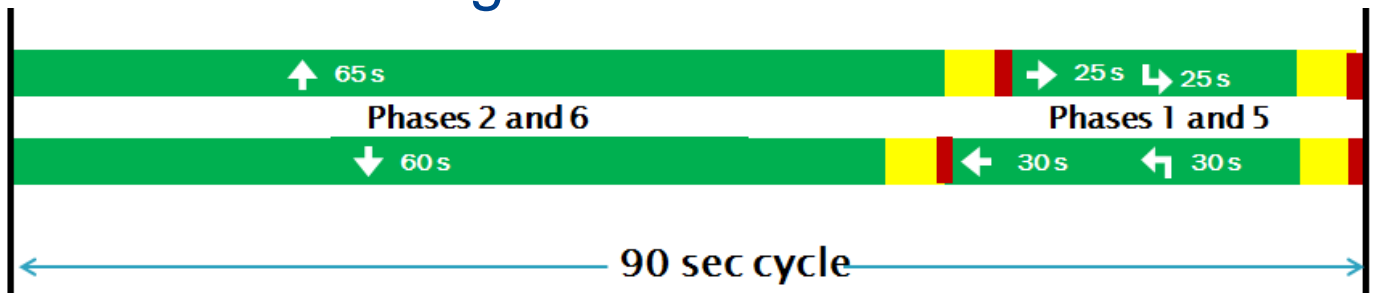
## Eight-Phased Signal



~50% reduction in control delay  
~46% increase in green time

Innovative

## Four-Phased Signal





# Opportunity Costs.....Scenario Comparison

## Strategy 1

- ✓ **Widen corridor by one lane in each direction**  
**\$90,000,000**



## Strategy 2

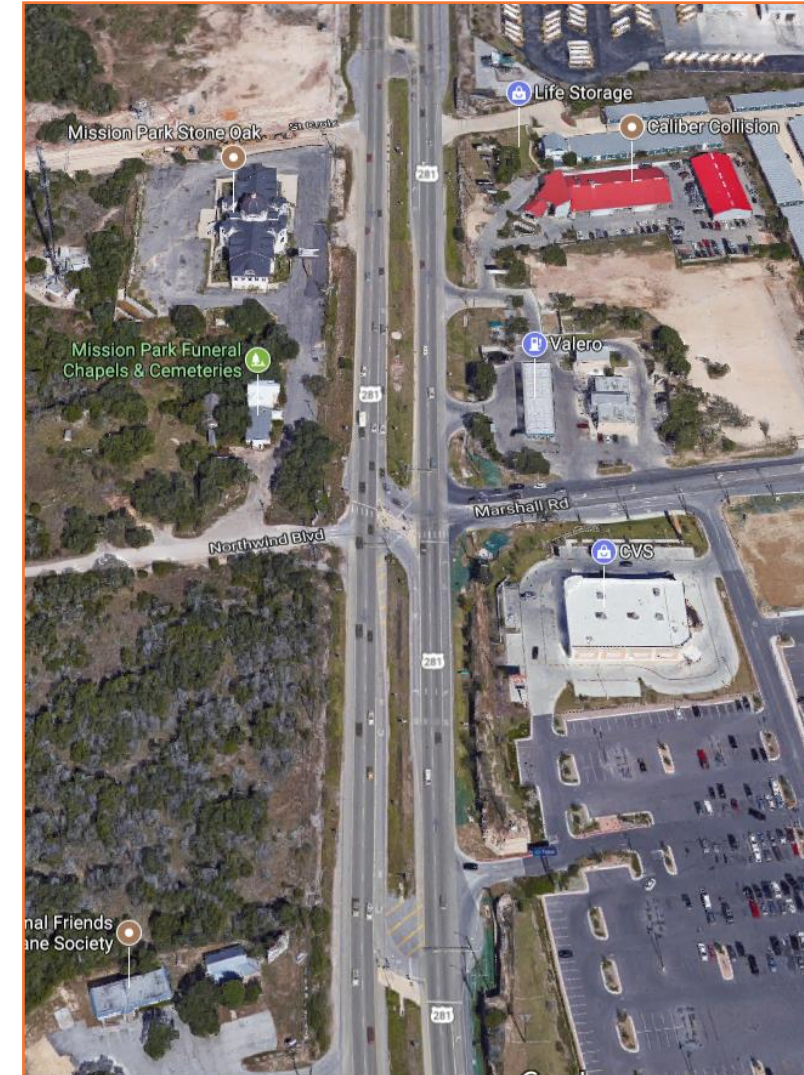
- ✓ **Convert entire corridor to innovative intersections, install adaptive signal controllers, and install transit signal priority**  
**\$30,000,000**



# Best Practices – US 281 in San Antonio, Texas

**Series of innovative intersections on US 281 in San Antonio, TX resulted in 34 - 40% decrease in peak hour corridor travel times**

“As traffic congestion on the U.S. Highway 281 eases due to the completion of the superstreet project, construction of new commercial and retail developments along the far North Central San Antonio corridor is ramping up.”

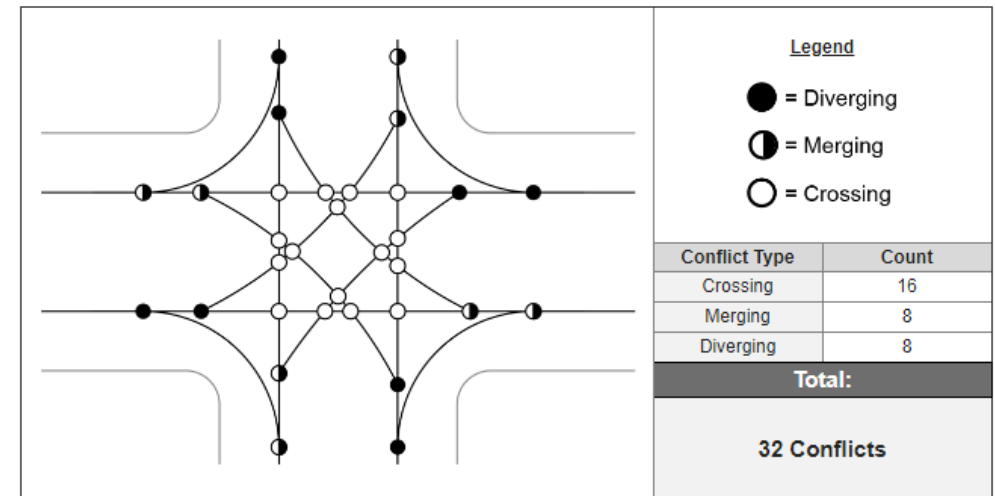




# Benefits of Innovative Intersections

- **Safety**
  - Fewer conflict points
  - Significant before/after crash reductions
- **Mobility**
  - Reduced delay
  - Reduced congestion
- **Value**
  - Less right-of-way needed
  - Lower construction costs
  - Quicker project delivery

Conventional Intersection: Conflict Points



# Innovative Intersection Policy

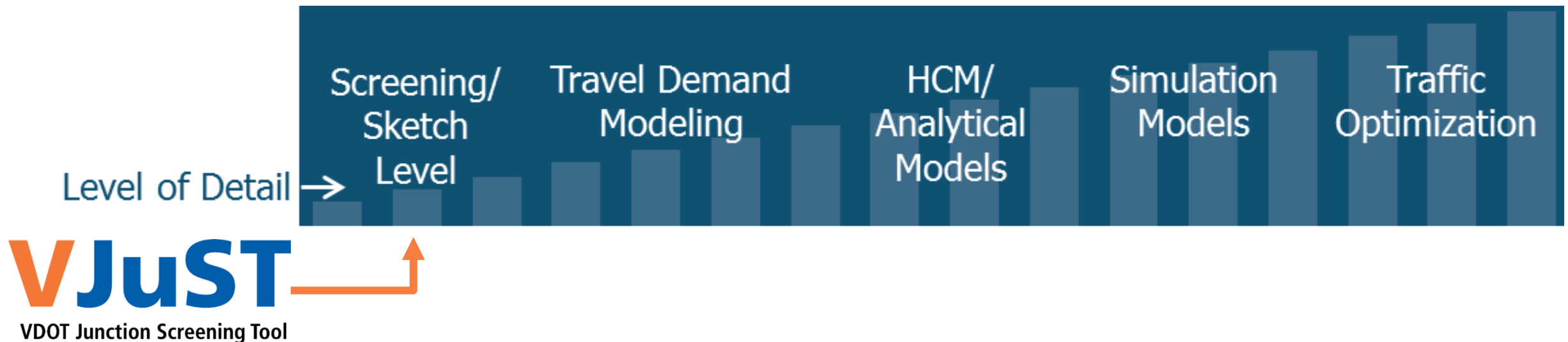
- **Roadway Design Manual**
  - Expanded guidance on innovative junction designs
- **IIM – TE-387.0 – Signal Justification Report**
  - Requires consideration of viable innovative junction design options before recommending signal
- **IIM – TMPD-2.0 – Corridor Planning Studies – Arterial Management Plans**
  - Requires consideration and evaluation of Innovative Intersection/ Interchange designs
- **IIM – LU-501.1 – Land Development Review**
  - Requires consideration of IIM–TE-387.0 for waivers or exceptions involving potential signals
- **Strategic Highway Safety Plan (SHSP)**
- **Increased SMART SCALE readiness requirements encourage innovative intersections**
  - Major Widening Projects
  - New Signals
  - Grade separations of at-grade facilities

# Innovative Intersection Resources

- **VDOT Innovative Intersection/Interchange Committee**
  - **IIM – TE-389, LD-257**
- **Developed tool to screen for potential innovative intersection solutions at intersections/interchanges**
  - **VDOT Junction Screening Tool (VJuST)**
- **Developed educational materials for staff and the public**
  - **Education is key to moving forward with innovative intersections**

# VDOT Junction Screening Tool (VJuST)

- Sketch-planning tool to aid consideration of innovative intersections
  - Results not meant to replicate results obtained from detailed analyses
- Advance configurations for further study, analysis, and design
- Only applicable to isolated intersections or interchanges

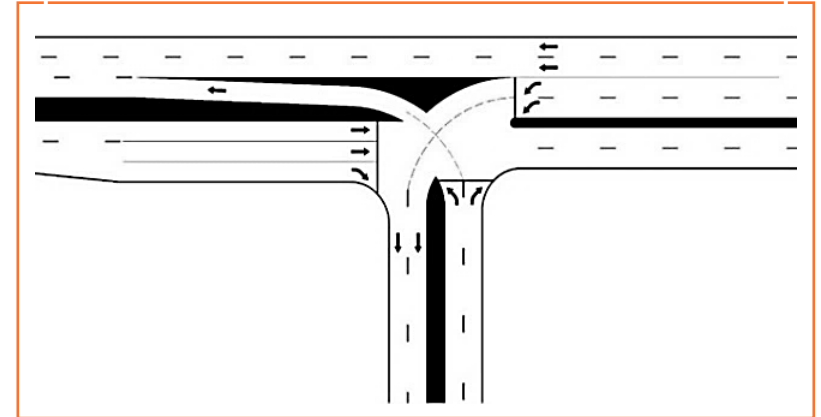


# VDOT Junction Screening Tool (VJuST)

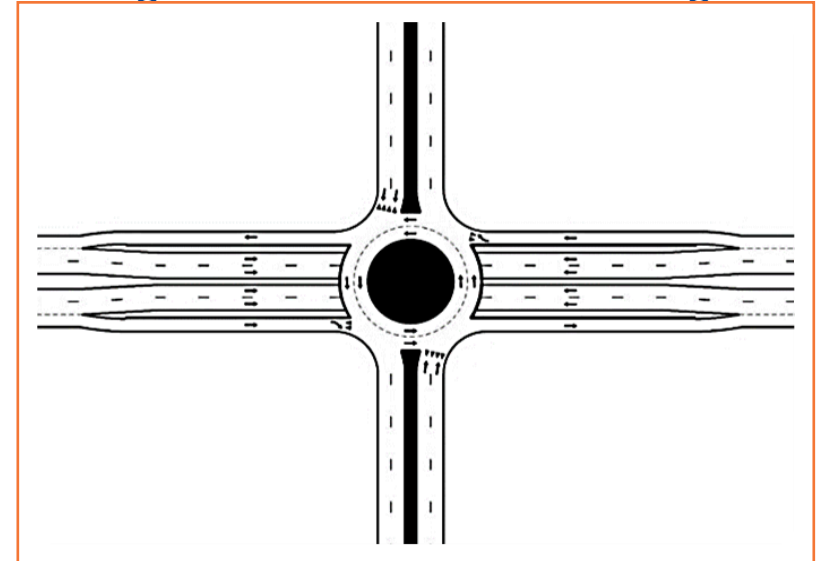
- 17 unique intersection configurations
- 9 unique interchange configurations
- Will help screen alternatives during:
  - Traffic studies (narrow potential design options)
  - Signal justification applications



Continuous Green-T Intersection

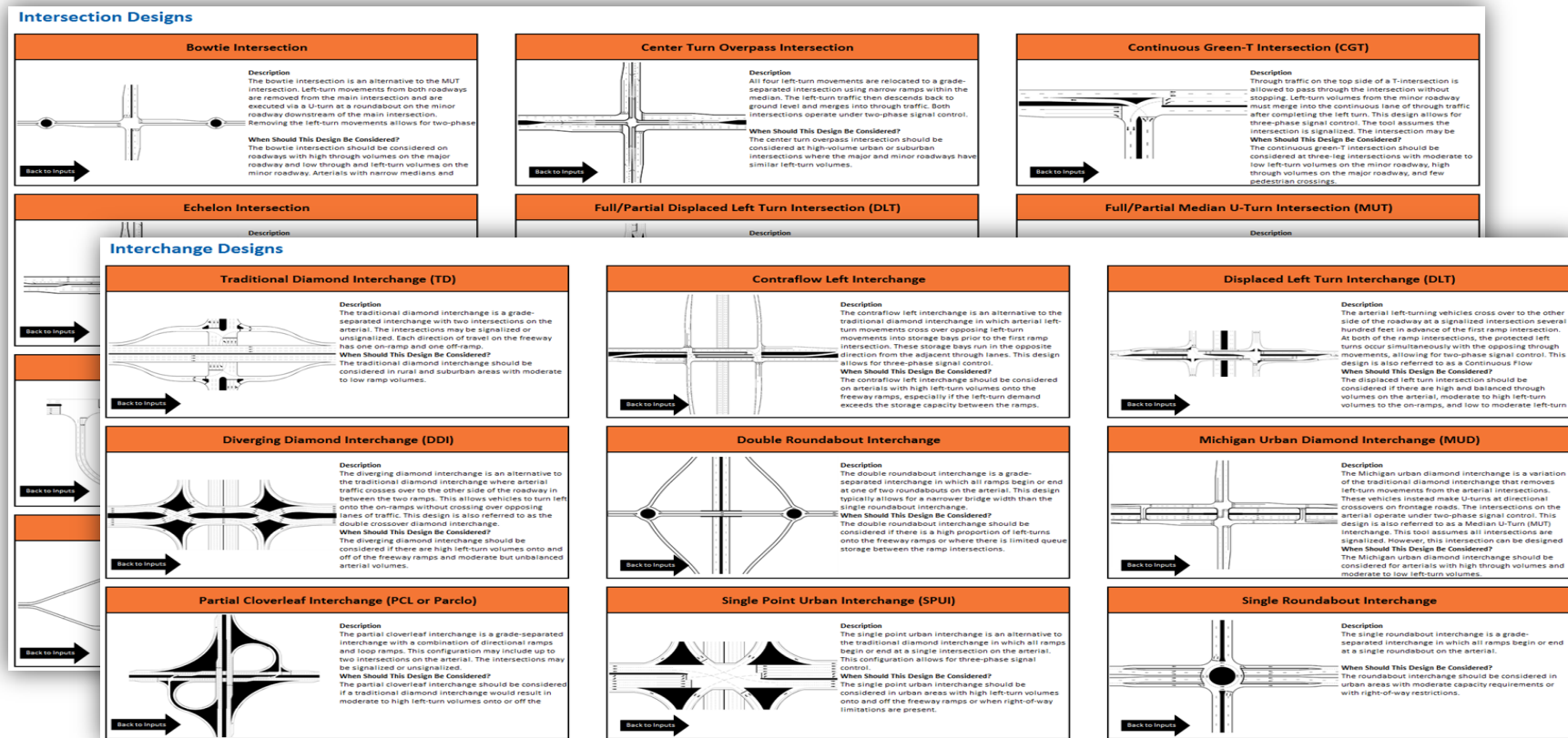


Single Roundabout Interchange



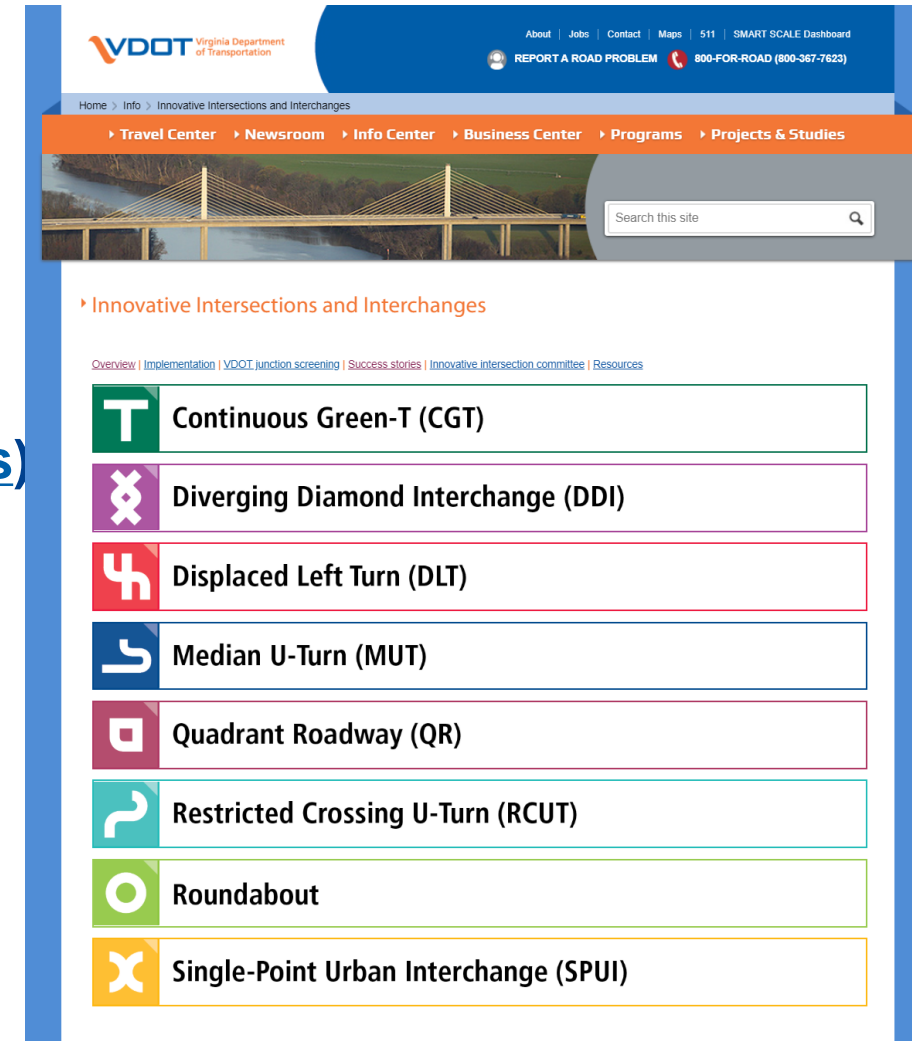


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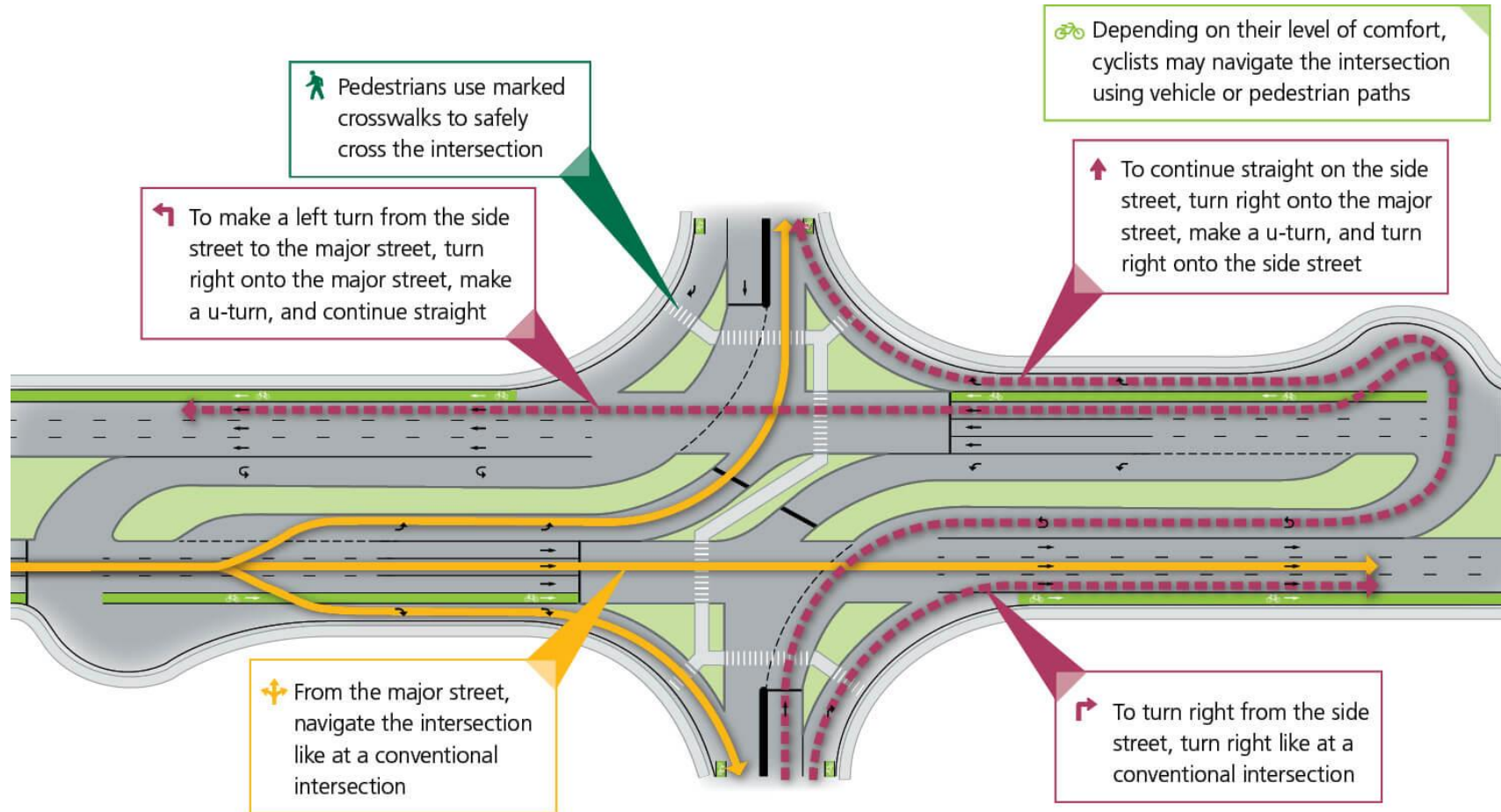


# Public Education and Understanding

- Lessons learned from other states
  - Communication is KEY!
- VDOT has adopted a holistic approach
  - Communications representative in committee
  - New and improved webpage has been developed (<http://www.virginiadot.org/innovativeintersections>)
  - Brochures, handouts, videos for public meetings
  - List of best practices being developed
- Local agencies can use these materials



# Public Education and Understanding



# Other Considerations

- **Innovative Intersection/Interchange Designs are not “One Size Fits All”**
  - Configurations may or may not be applicable
  - Consider a variety of factors in design
  - Engineering is encouraged!
  - The solution may not be a standard configuration
- **Public involvement is key**
  - Public education is important
- **Consider life-cycle costs**
  - Innovative intersections protect the long-term investments on roadways
  - Innovative intersections can reduce the need for signalization
  - Innovative intersections provide improved safety





# Questions

